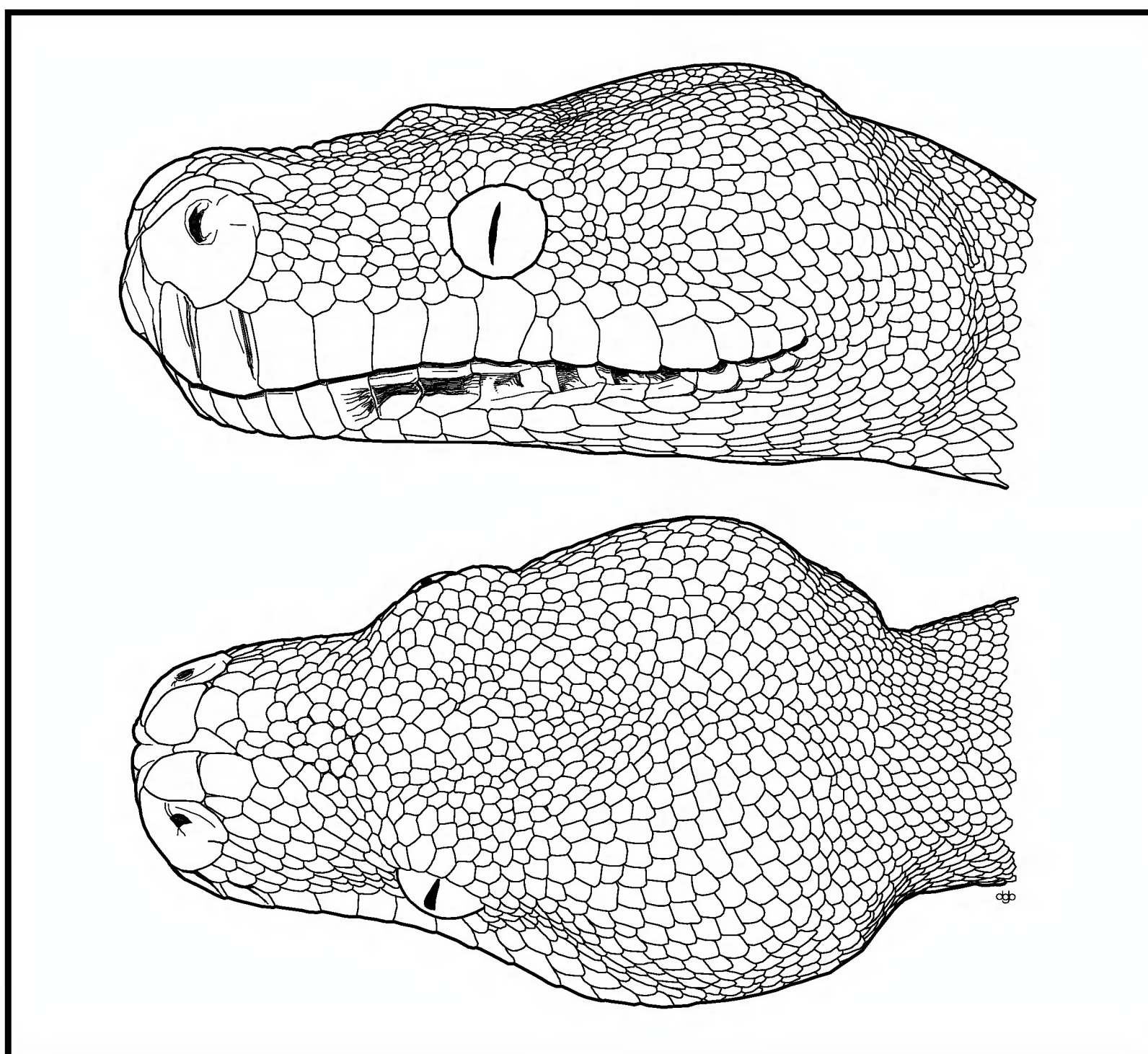

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Cover: Aru Islands specimens of the green tree python, *Morelia viridis*. Lateral view is of a female; dorsal view is of a male. Drawings by David G. Barker.

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A Study of Carapace and Plastron Patterns in the Spotted Turtle, *Clemmys guttata*, and Their Use as a Technique for Individual Recognition

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Abstract

The spot patterns of the carapace, the dark pigmented patterns of the plastron, and scute anomalies of spotted turtles (*Clemmys guttata*) were studied to identify characters that could be useful for individual recognition. A total of 38 spotted turtles were marked, of which 23 were recaptured, with 19 of these being recaptured at least one year after the initial capture. The spot pattern of the carapace remained relatively unchanged in 17 of 19 recaptured spotted turtles; while the dark pigmented pattern of the plastron remained stable in all 19 for an average of 3.5 yrs, and for as long as 8 yrs. Other characters found to aid in the individual recognition process included: supernumerary or cleft scutes of the carapace and plastron; symmetry or asymmetry of gular and femoral scute angles; and whether or not the suture between the third and fourth vertebral resembled a curved brace.

Introduction

The capability of researchers to identify individual animals is essential to studies of behavior, home range, and movements; and for estimating population size and density (McDonald et al., 1996; Cowin and Cebek, 2006). Ferner (2007) notes that perhaps the most ideal method of recognizing individuals is to use their own, naturally occurring variation in morphology. Identification of individual turtles using unique patterns has been described for the leatherback turtle, *Dermochelys coriacea* (McDonald and Dutton, 1996), diamondback terrapin, *Malaclemys terrapin* (Palmatier, 2007), and eastern box turtle, *Terrapene carolina* (Zeiller, 2002). In addition, Tynning (1990) and Carroll (1991) have suggested that pattern identification could be used as a method of individual recognition with spotted turtles, *Clemmys guttata*. Carroll (1999) used pattern and shell anomalies to recognize one individual for at least ten years. Although the above references discuss color pattern being used as a means of identification, few studies have monitored pattern changes over time in both the carapace and plastron of marked *C. guttata*, and the effects these changes may have on the identification of individuals. The goals of the present study were to examine data collected from spotted turtles regarding their carapace and plastron patterns, angles created by scute sutures on the plastron, and scute anomalies, and to determine what combination of these characteristics could be used to identify individuals over a eight-year period.

Materials and Methods

Carapacial and plastral patterns of spotted turtles were studied at a wetland complex in Erie County, Pennsylvania (see Gray, 2004, for a description of the site), from 1998 to 2006. *Clemmys guttata* were captured by hand, in basking traps, or in baited funnel traps. Upon capture, the following data were obtained for each turtle: date and time of capture, sex, estimated age, behavior, habitat, weather conditions, environmental and cloacal temperatures, body weight, and straight-line measurements. Age was estimated by counting growth annuli on the right or left abdominal scute, as described by Zug (1991). A

detailed presentation of these data, as well as population and density estimates, can be found in Gray (2004). In addition to the aforementioned data, the condition of the carapace (smooth or rough), location and number of spots, pattern of the plastron, and major anomalies and injuries were also recorded. Photographs of the carapace and plastron of each turtle were taken with a Pentax K-1000 manual camera or a Pentax ZX-7 automatic 35 mm SLR camera equipped with a 100 mm macro lens. For each photograph, the focal distance was set at 2.25 ft.

Carapace characteristics

Upon each capture, the position and number of yellow spots on the carapace were noted on a data form and documented with a photograph. The total number of spots on the carapace was compared between sexes using Student's *t*-test (two tailed, $\alpha = 0.05$). A correlation coefficient was calculated for comparisons between carapace length and total number of spots.

Another goal of the study was to determine if the number of spots on the right and left sides of the carapace were symmetrical. For this analysis, I used the photographs and data sheets from the initial capture of each turtle. On each turtle's photograph, a line was drawn with a ruler from the center of the cervical scute to the suture between the right and left 12th marginal scutes. The number of spots on each side of the midline was then counted. Any spots located on the midline were excluded. I used Student's *t*-test (two tailed, $\alpha = 0.05$) to determine if there was a significant difference in the number of spots on the carapace between the right and left sides. In addition, comparisons of the number of spots on the carapace between sexes were made.

The carapace of a spotted turtle was considered smooth if there were no growth annuli, or rough if there were growth annuli on the carapacial scutes. Anomalous scutes, such as supernumerary scutes and cleft scutes were noted on a data form, and also documented with photographs of the turtle's carapace.

For turtles that were recaptured more than one year after initial capture, angles of the right and left gular scute, and right and left femoral scute were compared from photographs of the earliest and latest captures. Angles were measured using a Shinwa Rules Company, LTD. No. 19 protractor to the nearest degree. Figure 1 illustrates the points used to obtain the angle measurements. The angles of each pair of gulars and femorals were measured twice, with the mean of the two measurements used to compare right and left sides. Determining the symmetry or asymmetry of the angles of the right and left side may be a useful character in dividing turtles into subgroups.

The percentage of dark pigment on the plastron was measured from photographs using a mechanical polar planimeter (model L-20 MA. Los Angeles Scientific Instruments Co., Inc. Los Angeles, CA 90039). First, the total area in cm^2 was determined by tracing the perimeter of the plastron. Next, the area of dark pigment was measured by tracing each pigmented area and adding these together. Finally, the percentage of coverage of the plastron with dark pigment was determined by dividing the total amount of dark pigment by the total area of the plastron, then multiplying by 100. The percentage of coverage was calculated twice for each turtle, and the mean of the two calculations was used. Photographs were also used to document new injuries and changes in pattern.

To prevent turtles from being misidentified, each was marked with a numbered monel tag (model #1005-1, National Band and Tag Co., Newport, Kentucky). See Gray (2004) for a description of tag attachment.

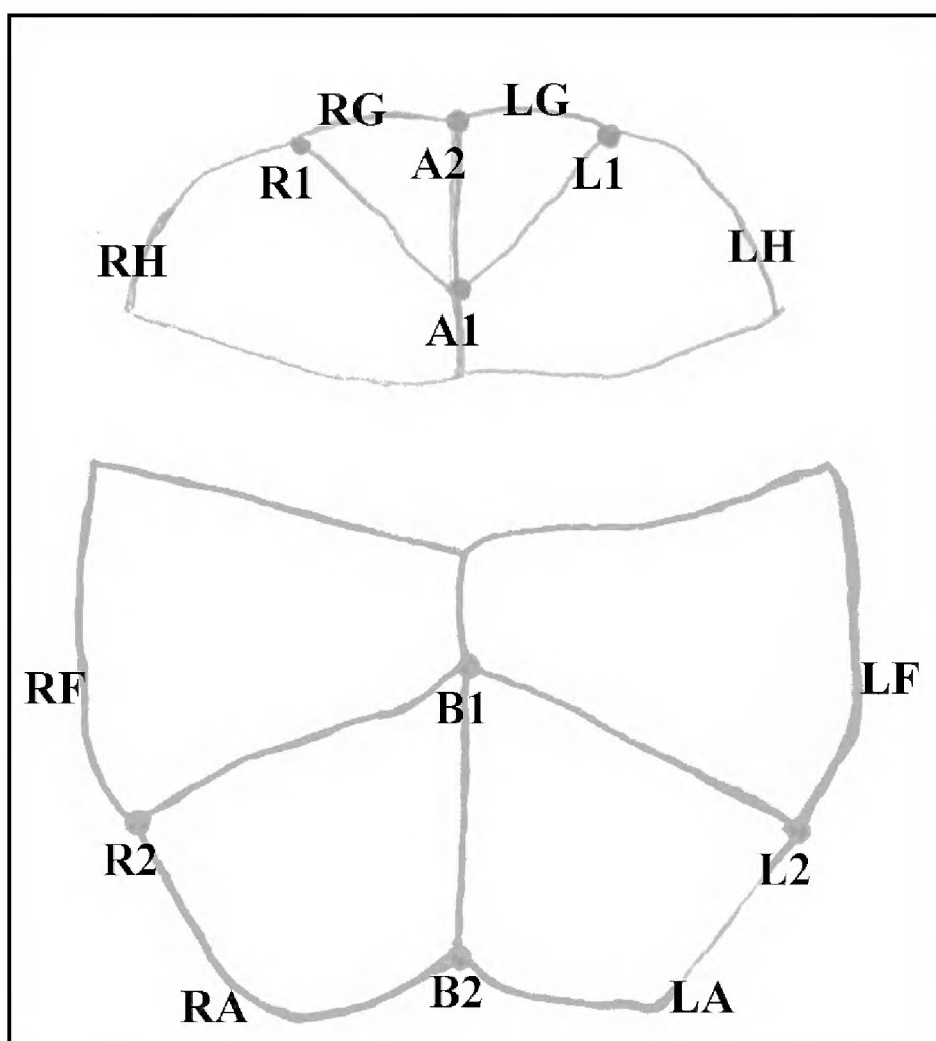


Figure 1. Measuring the angles of the gular and femoral scutes. The angle of the right gular scute (RG) is the angle R1–A1–A2. Similarly, the angle of the left gular scute (LG) is the angle L1–A1–A2. The angle of the right femoral scute (RF) is the angle R2–B1–B2. The angle of the left femoral scute (LF) is the angle L2–B1–B2. RH is the right humeral scute, and LH is the left humeral scute; RA is the right anal scute, and LA is the left anal scute.

Results and Discussion

Thirty-eight spotted turtles were captured, processed, and released during the study. Twenty-three of these were recaptured at least once, and of these, 19 were recaptured at least one year after being marked.

Spots on the carapace

In both sexes, total number of spots on the right side of the carapace was not significantly different than the number of spots on the left side (in males, $t = 0.17$, $d.f. = 38$, $P = 0.86$; in females, $t = -0.03$, $d.f. = 34$, $P = 0.98$). Nor was there a significant difference in the total number of spots between males and females ($t = 0.27$, $d.f. = 36$, $P = 0.79$). The number of spots in males averaged 55 (sd = 21.3, range 24–103, $n = 20$), while in females they averaged 53 (sd = 24.4, range 27–124, $n = 18$). Conant (1938) reported a range of 14–114 spots in Ohio specimens; while Ernst (in Ernst and Barbour, 1972) observed 21–

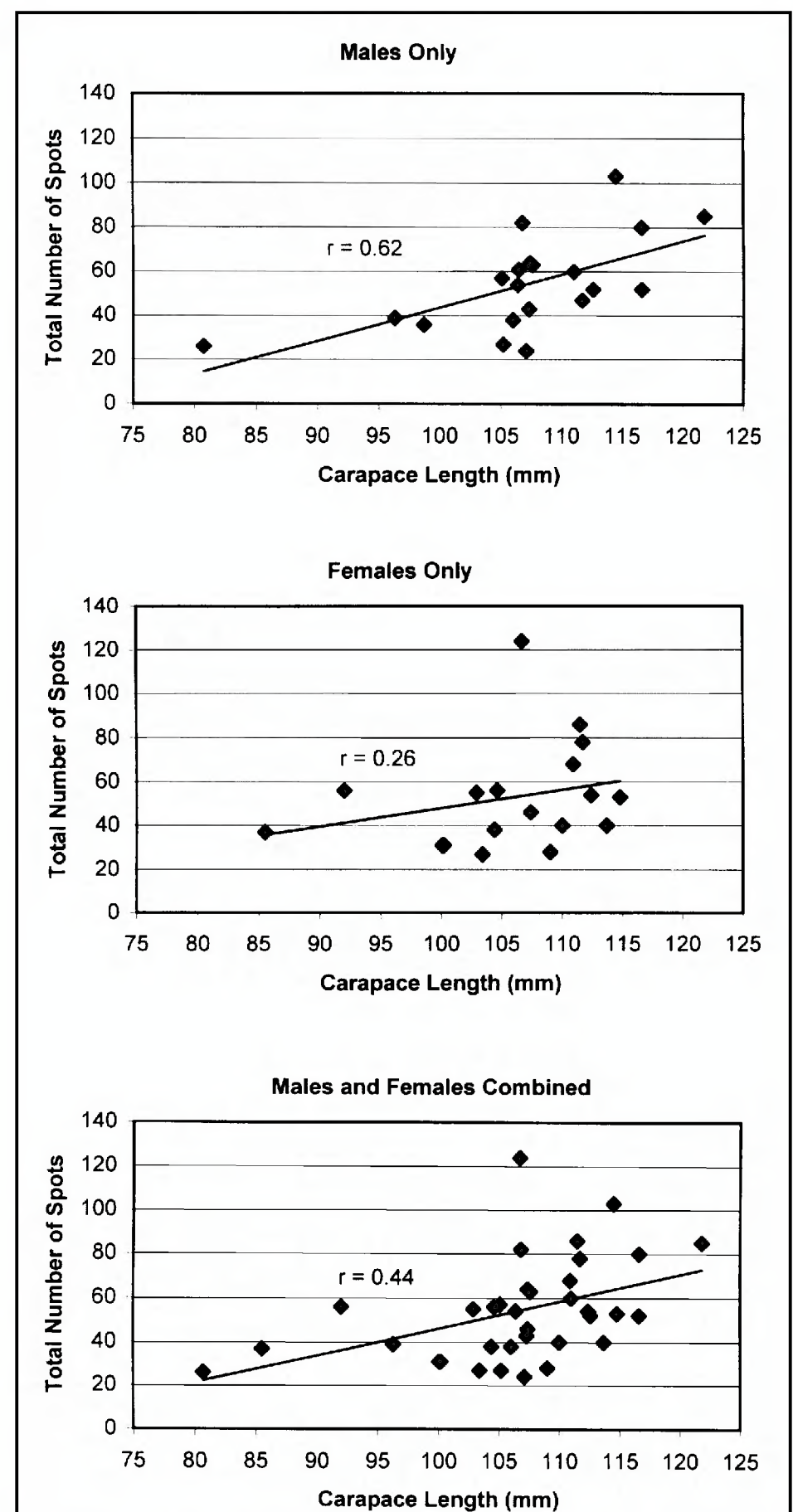


Figure 2. The relationship between carapace length and total number of spots in spotted turtles from Erie County, Pennsylvania.

Table 1. Changes in the number of spots on the carapace in spotted turtles, *Clemmys guttata* ($N = 19$), from Erie County, Pennsylvania. The initial number of spots does not include spots on the cervical scute or marginal scutes.

Turtle	Initial spots	Change
0001	14	1
0002	30	8
0004	26	0
0005	16	0
0008	12	0
0012	12	-1
0016	29	0
0017	27	-7
0018	18	0
0019	41	0
0021	28	0
0022	24	0
0023	32	-1
0024	43	0
0025	32	-1
0031	67	0
0032	22	1
0033	20	0
0034	54	-1

101 spots (males averaging 46.9 and females 42.6) in a south-eastern Pennsylvania population. Yerkes (1905) observed means of 60 spots in males and 69 spots in females. He further reported that female spotted turtles examined by him had 15% more spots than males. He suggested that the greater number of spots in females may have made them more conspicuous to males. In addition, Yerkes noted that there were more spots on the left side of the carapace than the right. No such differences were found by Grant (1935), or in the present study.

There was a significant positive correlation between carapace length and total number of spots in males ($r = 0.62$, $d.f. = 18$, $P < 0.01$), but not in females ($r = 0.26$, $d.f. = 16$, $P > 0.10$) (Figure 2). The observed differences may partially be explained by a smaller sample size and a more truncated range in females. When data for both sexes were combined, the correlation was also significant ($r = 0.44$, $d.f. = 36$, $P < 0.01$). It has been noted that ontogenetic changes in the number of spots on the carapace occur in spotted turtles (Carr, 1952; Pope, 1964; Ernst et al., 1994). Hatchlings have very few spots—usually one per scute, and as the turtles age there is an increase in the number of spots. One would thus expect larger turtles to have more spots than smaller ones, as the present study corroborates.

Of the 19 spotted turtles recaptured at least one year after the initial capture, eight displayed changes in the number of spots on the carapace. Four turtles lost 1 spot, another lost 7 spots, two gained 1 spot, and one gained 1 spot but lost 7 previously counted ones. These changes amounted to more than one

spot in only two turtles (0002 and 0017) (Table 1).

Extensive flaking and peeling of the keratinized layer of the carapace were also evident in these two turtles (Figure 3). This condition may have been caused by an injury to the carapace that was subsequently invaded by algae or an exfoliating fungus (M. W. Klemens, pers. com., 2001). In the present study, algal growth was observed on four spotted turtles (0018, 0019, 0021, and 0028); however, none of these individuals experienced flaking or peeling as observed in turtles 0002 and 0017. Carl Ernst (pers. com., 2000) noted that the condition of these two turtles resembled spotted turtles from Lancaster County that experienced drying of the carapace during terrestrial estivation or hibernation. In some very old individuals, a decrease in the number of spots due to fading or darkening has been noted. This may proceed to the point that some individuals may lack them entirely (Harding, 1997). No turtles in the present study lacked spots.

One turtle (0028) had areas on the carapace where the outer keratinized layer was missing in patches, exposing the underlying bone. This condition was observed about 11 months after the turtle was initially captured, and did not affect the pattern of spots on the carapace. The cause of these “injuries” was not determined.

Condition of the carapace

A rough carapace occurred in 13 spotted turtles (7 males and 6 females); 25 had a smooth carapace (13 males and 12 females). Turtles with a smooth carapace had significantly greater estimated ages than those with a rough carapace ($t = -2.80$, $d.f. = 36$, $P = 0.0003$). Mean estimated age for turtles with a rough carapace was 13 yr (sd = 2.8, range 8–18, $n = 13$), those with a smooth carapace averaged 17 yr (sd = 2.8, range 11–22, $n = 25$). The rough condition has been attributed to both juveniles (Dekay, 1842; Minton, 1972; Harding, 1997) and adults (McCauley, 1945; Carr, 1952; Palmer and Braswell, 1995). It has not been determined what causes the smoothing of the carapace, although it is often assumed that it becomes smooth with age. However, if gradual wearing of the carapace due to abrasion was the main cause, one would expect the plastron to become smooth as well. All spotted turtles in the present study had very distinct growth annuli on their plastrons. In turtle

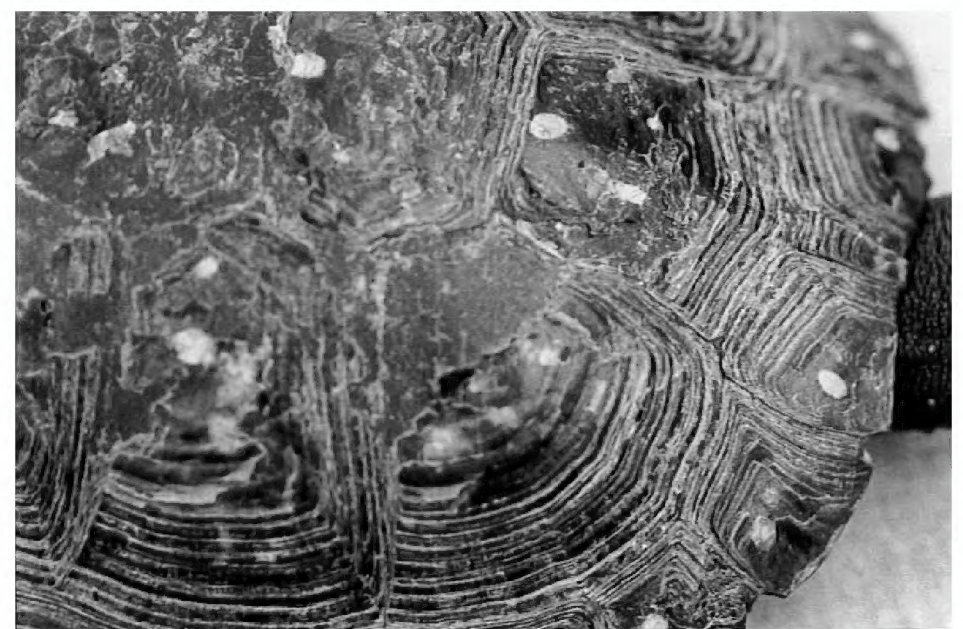


Figure 3. This image of spotted turtle 0002 illustrates the flaking and peeling of the outer keratinized layer of the carapace. Note the smooth area where scutes have peeled.

Table 2. Summary of supernumerary, cleft and anomalous carapace scutes on spotted turtles from Erie County, Pennsylvania.

Frequency	Condition	Description of condition
1	A	last three vertebral scutes with unequal sides
1	B	extra scute between 1st vertebral and 1st left pleural
1	C	extra scute on either side of 1st vertebral
1	D	in addition to condition C, also an extra scute between 1st and 2nd left pleurals
2	E	first vertebral cleft on both sides
1	F	two extra scutes on the left side involving vertebral scutes 3, 4 and 5
2	G	extra scute between 4th and 5th vertebral scutes on right side

0002, the carapace became smooth in areas where there was extensive flaking and peeling of the keratinized epidermal scutes (see above).

Nine of the 38 spotted turtles marked (24%) had either cleft or extra scutes on the carapace. These are summarized in Table 2. Another character that may be useful in distinguishing between individuals is whether or not the suture between the 3rd and 4th vertebrals resembles a curved brace (e.g., ) (Figure 4). The “curved brace” condition was observed in 34% of the 38 turtles marked—7 males and 8 females. In four of these the “curved brace” was asymmetrical or irregular.

Healed injuries to the carapace can also be used as an aid in identification. Six turtles (0001; 0003; 0010; 0020; 0029; 0032) had healed injuries that were extensive enough to be assumed “permanent.” Turtle 0001 had a deep scar on the left first pleural that remained relatively unchanged for a period of eight years.

Plastron characteristics

The right (R) and left (L) gular scute angles and the R and L

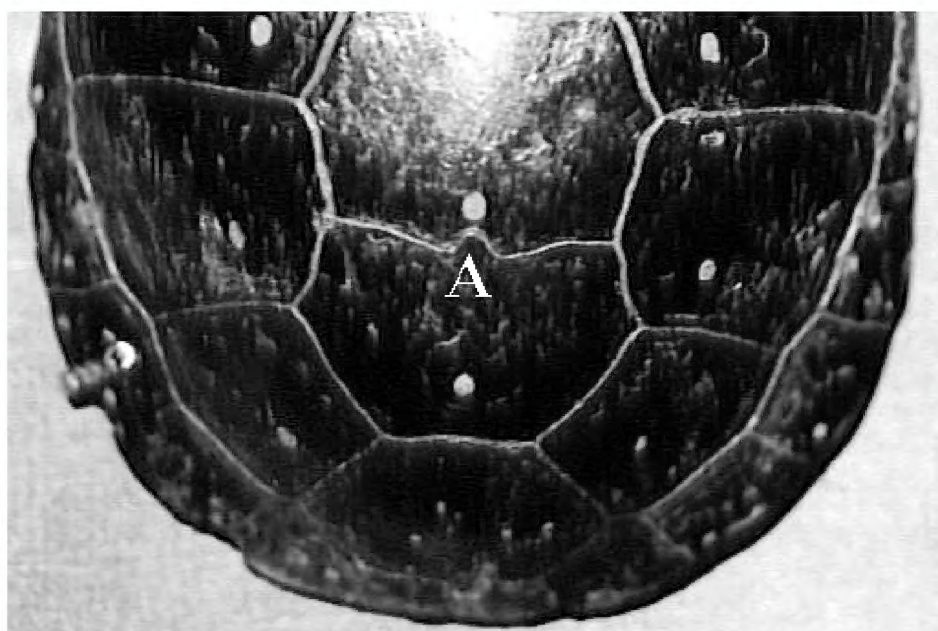


Figure 4. The curved brace character, formed by the suture between vertebral scutes 3 and 4, can be seen in this image. The “A” in the image is near the center of the brace.

femoral scute angles occurred in three conditions: condition A: $R < L$; condition B: $R = L$; condition C: $R > L$. Regarding the gular scute angles, of the 19 spotted turtles recaptured at least one year after the initial capture, 26% ($n = 5$; 3 males: 2 females) had condition A ($R < L$); 42% ($n = 8$; 6 males: 2 females) had condition B ($R = L$); and 32% ($n = 6$; 2 males: 4 females) had condition C. The results for femoral angles were similar, with 26% ($n = 5$; 3 males: 2 females) having condition A; 37% ($n = 7$; 4 males: 3 females) condition B; and 37% ($n = 7$; 4 males: 3 females) condition C. Although these angles may change in very young or subadult turtles, they were consistent characters in the adult turtles studied here. Years between captures averaged 3.5 ($sd = 2.1$, range 1–8, $n = 19$).

Plastron pigmentation

The pattern created by the dark pigment on the plastron was unique to each individual. Coverage of the plastron by dark pigment averaged 75.4% ($sd = 10.5$, range 49.1–93.4, $n = 38$). There was no significant difference between males and females in regard to percentage of the plastron covered by dark pigment ($t = -0.08$, $d.f. = 36$, $P = 0.94$); males averaged 75.3% ($SD = 10.9$, range 56.6–93.4, $n = 20$), females averaged 75.5% ($SD = 10.3$, range 49.1–87.2, $n = 18$). In the 19 spotted turtles recaptured more than one year after the initial capture, the plastron pattern remained practically unchanged; for turtle 0001, this period was almost eight years (Figure 5). There was a significant, but weak positive correlation between carapace length and percentage of plastron covered by dark pigment ($r = 0.34$, $d.f. = 36$, $P < 0.05$). When the sexes were analyzed separately, a significant correlation was observed in males ($r = 0.51$, $d.f. = 18$, $P < 0.05$), but not females ($r = 0.13$, $d.f. = 16$, $P > 0.05$). This is likely a result of the smaller sample size and more truncated range observed in the female data.

The pigmentation of the plastron is known to undergo ontogenetic changes; from a dark central figure in hatchlings, which “spreads” outward toward the margins of the plastron as the turtle ages, leaving a central, lightly colored area that is typical in adults (Pope, 1964, Ernst et al., 1994; Mitchell, 1994). The observations made during the present study suggest that the

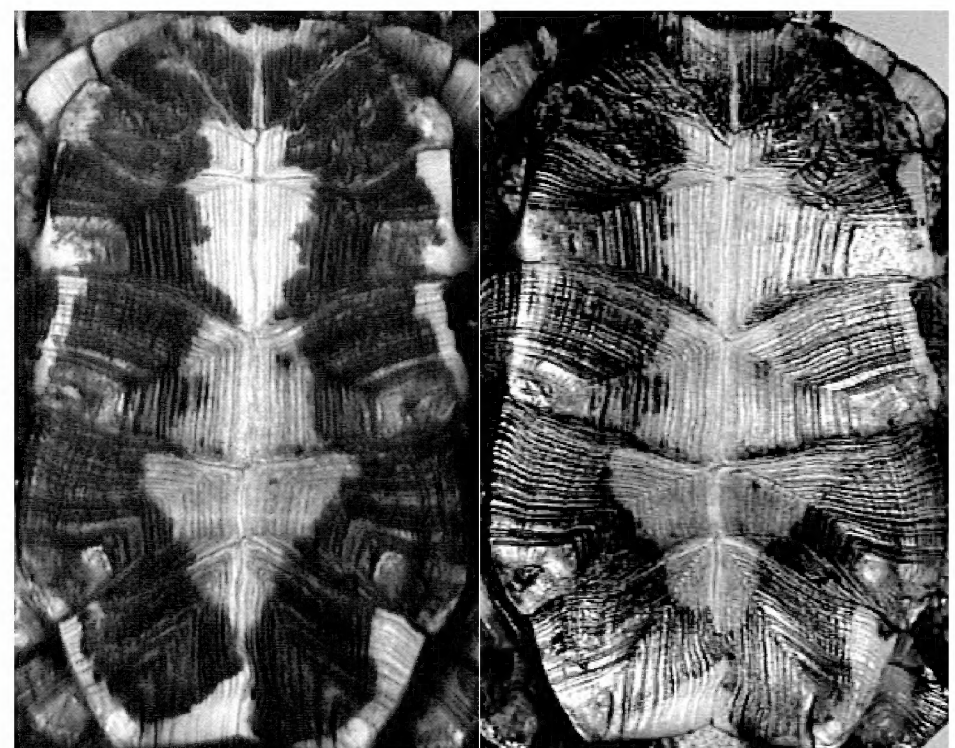


Figure 5. Images of the plastron of spotted turtle 0001. The left image was taken 8 June 1998; the right image was taken 30 April 2006.

pattern of the plastron in adults is stable enough to be used for individual recognition in spotted turtles in studies lasting at least five years, and likely more. In some individuals; pigmentation progresses with increasing age and the entire plastron may be dark (Ernst et al., 1994). No turtle in the present study had an all-dark plastron.

Cleft, extra, and/or otherwise anomalous scutes on the plastron were observed in six individuals (2 males: 4 females). One turtle had three extra scutes near the posterior apex of the gulars; two others had extra scutes separating the abdominal scutes; one had asymmetrical anal scutes ($R < L$) of which the left was also cleft; one had very irregularly shaped pectoral and abdominal scutes that were much narrower toward the center of the plastron. The gulars of turtle 0033 were unique among all the spotted turtles marked during this study, in that they “curved” to the left. Twelve of 19 spotted turtles (6 males: 6 females) recaptured after more than one year of being marked, had significant healed injuries that were still distinct after an average of 3.75 yrs ($sd = 2.5$, range 1–8). These injuries included deep, healed scars of various shapes ($n = 7$); notched scutes ($n = 2$); deep pitting ($n = 1$); “chewed” outer edges of scutes ($n = 1$); and healed fracture ($n = 1$). Most, if not all, of these injuries were the result of attempted predation. Of the total 38 spotted turtles marked at this site, 65% ($n = 25$) had evidence of attempted predation in the form of chew marks on the carapace and or plastron (Gray, 2004).

Ontogenetic changes in the spot pattern of the carapace and the pigmentation pattern of the plastron could not be thoroughly studied in juveniles, as only four subadults were marked, and of these, three were recaptured. The smallest of these (0012) was 80.7 mm carapace length, and estimated to be 8 yrs old upon initial capture. This individual had reached sexual maturity within three years of being marked. Two of the subadult spotted turtles (0002 and 0012) displayed changes in the number of spots on the carapace between captures (see above); however, neither experienced any noticeable changes to the pattern of the plastron. Other interesting changes were observed in two males—turtles 0012 and 0018. The observed changes in the pigmentation of their chins were as follows: Initially, the chin coloration was reddish-yellow (0012) and orange (0018), and characteristic of that observed in females. The coloration darkened over time, until the chin coloration was characteristic of a male spotted turtle (Gray and Curtis, 2003). These changes were accompanied by changes in the plastron from flat to concave, and changes in the location of the vent relative to the margin of the carapace. Blake (1922) observed an aberrant male spotted turtle that had throat markings and mandibular stripes that were like that of a female.

Cowin and Cebek (2006) concluded that it was not feasible to use the plastral patterns of juvenile wood turtles, *Glyptemys*

insculpta, as a means of individual recognition, partly because of ontogenetic changes. It is likely that this is true in *Clemmys guttata* as well. Juvenile spotted turtles undergo similar ontogenetic changes in the pattern on the plastron as do juvenile *G. insculpta*.

Spotted turtles are long-lived, with delayed sexual maturity, low fecundity, high survivorship of adults, and usually small population sizes. Demographic traits such as these limit the ability of turtle populations to absorb any human-induced increases in mortality (Gibbs and Amato, 2000). Therefore, it would seem prudent to err on the side of caution when it comes to marking turtles that are rare, or in the case of *Clemmys guttata*, experiencing population declines. The effects on individual survival due to marking by notching or tagging are assumed to be minimal. The assumption is often made that a high number of recaptures indicates negligible mortality due to marking, but studies testing this assumption appear to be lacking.

One of the primary functions of the reptile epidermis is to prevent invasion by bacteria, fungi and parasites (Rossi, 1996). Various forms of trauma, of which notching and tagging could be included, penetrate the outer keratin layer and underlying bone, which may result in a shell abscess and provide access for bacteria and fungi (Boyer, 1996; Rossi, 1996; Harvey-Clark, 1997), perhaps causing infections that could affect survivorship. In addition to the risk of infection, marking specimens by notching or tagging may cause undue stress to the animals that might alter their behavior. Photo identification of turtles is non-invasive, and may be less stressful to the animals than notching or tagging.

Spotted turtles have modest population sizes; usually fewer than 250 individuals (Graham, 1995, Milam and Melvin, 2001, Gray, 2004), thus making individual recognition using photographs a practical method. This is especially true if a system is devised that arranges photographs of individual turtles into subgroups based on a combination of characters, such as sex, carapace scute anomalies, plastron scute anomalies, angles formed by scute sutures, healed injuries, spot pattern of the carapace, and pattern of the plastron. Digital cameras, in addition to being more economical than the 35 mm cameras used in this study, also allow the researcher to manipulate photographs, enhancing hard-to-see characteristics.

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Serpents and the North American Fur Trade

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Abstract

Fur traders made a variety of goods available to Indians in exchange for pelts, including guns. Curiously, a gun that became more-or-less standard in that trade for two centuries contained a herpetological image—a serpent mounted on the left side of the wooden stock, opposite the firing mechanism. We illustrate several of these side plates and offer some hypotheses regarding their evolution and meaning.

It can be argued that Europeans brought the Iron Age to the Amerindians with the start of the fur trade in North America (Hanson, 2005). This is more-or-less obvious from the pots, kettles, axes and knives that were used as trade goods. Such goods were highly desired by the Indians, especially in relation to smaller furs (e.g., beaver) to which they attached little value. Perhaps no items were more desirable to the Indians than the trade guns that were an integral part of the offerings of fur traders. Although Indians along the St. Lawrence had acquired as many as 200 matchlocks from a French smuggler in 1620, these never became popular. Superior flintlocks were made available by the Dutch around 1640, along with powder and lead. Spanish guns also entered Indian hands in Florida and in the southwest, with some of the latter articles filtering into Indian trade routes, and eventually finding their way as far as Montana. Most trade guns, however, were provided by the British and later by Americans, including such famous makes as Deringer, Hawking, Henry, and Leman.

An interesting aspect of many of the early trade guns, and the reason for this article, was a stylistic feature that became a standard element. On the left side of the wooden stock, opposite the flintlock action, a serpentine plate was attached by bolts. The very earliest examples of this plate occurred around 1700 or somewhat earlier. All examples we have seen, including the ones shown here, have what has been referred to as “a sea serpent or dragon” look. The Museum of the Fur Trade (Chadron, Nebraska) has the world’s most complete collection of these smoothbore flintlock muskets, and every one of them has the serpentine side plate.

To understand this matter more deeply, it is essential to

recognize that well over two dozen companies were involved in the North American fur trade, as well as uncounted individual entrepreneurs. The fur trade was lucrative and highly competitive. A trader needed to have goods that the Indians wanted, and the quality had to be at least as high as that of the competition. This led to a certain uniformity in trade goods, especially the guns. The musket that became more-or-less standardized, the so-called Northwest gun, always had the brass serpentine side plate, a full wood stock with a flat brass butt plate, a light iron trigger guard, a .58-caliber, smooth-bored, octagonal barrel, and brass ramrod guides. The guns ranged from 46 to 64 inches in total length, with barrel lengths from 30 to 42 inches. The shorter guns were preferred by the Indians, who used the weapons from horseback. These guns could be used as shotguns, firing many small pellets, as well as muskets, firing a single large ball. This versatility was surely part of the reason why some Indians preferred the Northwest gun even after more sophisticated weapons and rifling became available. Of course, this preference also depended upon the guns possessed by enemies, a factor that could take us into a lengthy digression (Mayer, 1943). The fundamental fact was that the Northwest gun remained the standard trade gun at fur trading posts throughout the Great Lakes and Hudson Bay regions, along the Missouri drainage and the Rocky Mountain region. The only serious modification to the basic design that eventually became relatively common was conversion from flintlock to percussion.

Table 1.

Alternative names for the Northwest gun*	
Fusil	London fusil
Fusee	Hudson Bay gun
Fuke	Mackinaw gun
Carolina musket	North gun
Indian gun	Norwest gun

* Chief’s gun was a relevant term, but this item was a Northwest gun of higher quality, typically with silver inlay or other ornamentation. Such a gun was usually a presentation piece.



Figure 1. Northwest gun made by Pritchett (1819). Each gun in Figures 1–7 was made by a different manufacturer.

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Figure 2. Northwest gun made by Wheeler (1815–1820), later converted to percussion.

The cost of the Northwest gun was 20 beaver pelts. One pound of black powder cost four beaver pelts, whereas one pound of shot cost one pelt. Three flints also cost one pelt. As near as we could tell, these costs remained stable throughout the fur trade (Hanson, 1955).

Of course, the Civil War changed things because of the profound advances in gun design that occurred during and after that conflict. Breech loading guns and especially the dramatic repeating rifles eventually superseded the Northwest guns, causing the latter to fade into history rather quickly. In fact, by the time of Custer’s battle at the Little Bighorn, some Indians had repeating rifles whereas Custer’s troops had single-shot rifles, another opportunity for a lengthy digression (Hanson, 1968).

The issue for us is to understand the significance of the serpentine motif associated with the classic Northwest gun. When and where did it begin? What did it represent? Why did it remain a signature characteristic of the Northwest gun? Unfortunately, we can give only partial answers to these questions.

George (1947) pointed out that the English shifted from matchlock to flintlock muskets during the reign of William III (1689–1702), a time when English gun manufacturers were not yet well developed and not prepared to produce flintlocks in quantity. Therefore, the new flintlocks came mostly from Holland, and the Dutch gunsmiths routinely made use of a serpentine side plate. As English gun manufacturers progressed in the eighteenth century, some of the Dutch models were essentially copied, including the side plate. The trade guns came out of this tradition. The functional significance of the side plate was that “through-bolting” from side plate to lock mechanism



Figure 3. Northwest gun made by Whateley (circa 1810).



Figure 4. Northwest gun made in Belgium (stamped 1854).



Figure 5. Northwest gun stamped “CH&S Co., NY” (date of manufacture unknown).



Figure 6. Northwest gun initially manufactured as a percussion gun by Hollis (circa 1880). The continued use of the serpentine side plate at this late date is evidence of its cachet value.



Figure 7. Northwest gun sold by Hudson’s Bay Co. (circa 1865).



Figure 8. Because the serpentine side plate was a feature common to all Northwest guns, regardless of manufacturer, the Museum of the Fur Trade (Chadron, Nebraska) offers facsimile side plates for sale as souvenirs. This is an example.

resulted in a stronger attachment of the lock than could be achieved by simply screwing the lock to the wooden stock. Therefore, the side plate was not purely ornamental; it was in essence a large washer with three holes. This point, however, does not explain the serpentine shape. Our hypothesis is that the serpent entailed little surface area, and mass, adding minimal weight to the gun. Certainly this would be true relative to a rectangular side plate covering the same length of stock as was covered by the serpent. Whether this shape had any significance to Dutch or English gunsmiths beyond its adaptability to the task at hand is conjectural. On the other hand, the aesthetic appeal of the serpentine plate was probably no less obvious to these people than it is to us. Incidentally, one of our early hypotheses was that the sea serpent might have been a logo or proof mark of the initial Dutch manufacturer, but no evidence for this idea was found in our historical material.

That the serpentine side plate remained a signature characteristic of the Northwest gun for two centuries is probably a joint consequence of manufacturer inertia and customer expectation. The design served its purpose well, so manufacturers were happy with a tried-and-true component. User satisfaction with the guns would lead friends, associates, and children to desire the same experience; and what better way to promise that experience than to have a standard design? Whether the serpentine side plate had additional significance for Indian users of the Northwest gun is unknown. Psychological speculation might be interesting, perhaps relating the serpentine shape to unconscious images of fertility, power, and immortality. Yet, we are unaware of any anthropological evidence that might support such thinking. Until information along these lines comes to light, we prefer to end simply by affirming that serpentine side plates on Northwest guns constitute a tantalizing two-century run of herpetological images in association with firepower, warfare, wealth and exploitation. Certainly this assertion is supported by the fact that the serpent came to symbolize a weapon of acceptable quality and that Indians would refuse to trade if a proffered gun did not contain this feature.

Acknowledgment

Illustrations of trade guns were taken from several publications, including an anonymous 1999 brochure (*The Jewel Box on Bordeaux Creek: The Museum of the Fur Trade Story*) and Hanson (1955).

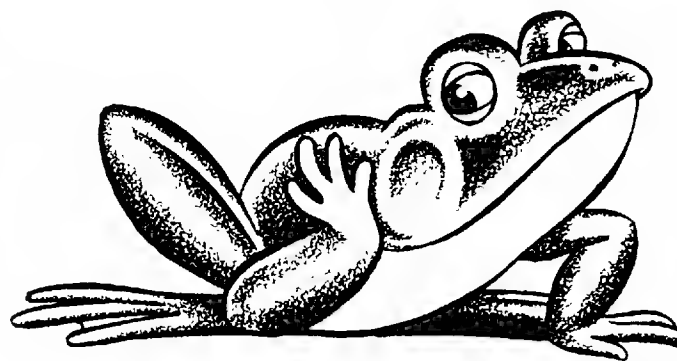
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The Tympanum

On behalf of the Cryptobranchid Interest Group (CIG), I would like to extend our gratitude for your generous donation of \$405.00. Securing funds for creatures that are poorly understood and for some, viewed as "insignificant" is difficult to say the least. That is why your donation is especially important. These monies will be used to support needed *in-situ* fieldwork for cryptobranchids. Hellbenders, Japanese and Chinese giant salamanders are rapidly declining throughout their natural ranges and are experiencing considerable pressures in the wild. Information learned from field studies in Japan, China and the United States will lay the foundation for responsible population man-



agement for cryptobranchids, as well as sustainable habitat usage for the people that coexist in their environment. Collaborative efforts between public facilities, government agencies and private individuals are the only way we can conserve wildlife in the future. It is charitable support like yours that facilitates immediate conservation action. Thank you for helping

preserve the world in which we live. Your personal contributions make all the difference! **Diane Barber, Co-chair, CIG Steering Committee, Curator of Ectotherms, Fort Worth Zoo, 1989 Colonial Parkway, Fort Worth, TX 76110.**
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What You Missed at the June CHS Meeting

John Archer
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TV crews from most of the local networks were on hand for June's meeting. For the last few days I'd been handling phone calls from the press wanting information about "White Sox." That's the name given to the 4½-foot alligator rescued from the Chicago River by Bob and Dan. Apparently the local alderman decided to call it that. Do a search of "alligator Chicago River" and you'll be filled in on the saga. The rescue effort was documented by several news organizations, and Bob and Dan handled the media as well as they handled the animals. Not that I'm implying any similarities between a ravenous, cold-blooded, simple-minded, aggressive creature and an alligator.

OK, that's probably a cheap shot and unfair to the press, especially in this case. All of us are aware of how inaccurate news reports can be, but in this case, the press managed to get the story as close to accurate as they're likely to get. I'm always leery when talking with the press, but since Bob and Dan did such solid groundwork and they agreed to bring the alligator to Show and Tell, I told the reporters that they could get follow-up shots at the meeting. Not all publicity is good, but I couldn't see any downside to this other than a little more excitement at Show and Tell. I know that four crews showed up, and I suspect more were there. Some news must of knocked White Sox out of the lineup, however, because I couldn't find any references to her or the CHS the next day. The press is always fickle.

Bob and Dan gave an overview of the capture so that we all got to meet White Sox. Once the press got their footage and we quickly went over some CHS business, we launched into the kids' raffle. This annual tradition is solely the creation of Jack Schoenfelder. He made sure that every person in the room under 18 got a free raffle ticket. We didn't have as many kids as past years, so Jack raised the age to 18 and under. Then each ticket holder chose from a great assortment of stuffed animals, toys, books, and even a 50-gallon aquarium. Everything is supplied by Jack and because of his hard work, no kid leaves the meeting without a prize. He shops all year long for the prizes, then drives nearly three hours from Indiana to get to the meet-



Dave Smiskol with a double handful of tiger ratsnake.

ing. Thanks, Jack. Josh Chernoff then ran the regular raffle featuring great prizes provided by generous members and some of our commercial donors. Top prize this month was a brand new ZooMed terrarium. And then the real excitement started.

A really long, really mobile tiger ratsnake or chicken snake (*Spilotes pullatus*) native to northern South America and Central America kept Dave Smiskol busy trying not to let it get away. Dan Nathan talked about green iguanas (*Iguana iguana*) as one perched on his shoulder gently licked Dan's ear. Joey Robinson showed off another wiggly creature, a year-old cornsnake (*Pantherophis guttatus*) named Cody, and displayed his adopted three-toed box turtle (*Terrapene carolina triunguis*). Nancy Kloskowski held a gorgeous rainbow boa (*Epicrates cenchria*)



Dan and Bob with White Sox.



Joey Robinson told about his adopted three-toed box turtle.



Young members enjoyed a special raffle, thanks to the generosity of Jack Schoenfelder.



Robert Hoppenrath does the heavy lifting while his dad Rick does most of the talking.



Michelle Neilson tells how she nursed this rescued ball python back to health.



Perhaps Mike Perry should have named his leopard gecko "Chip"?



David Fourer shared his knowledge of the silkworms he's been raising, and offered freebies to anyone interested.



Andy Sagan holds an Egyptian uromastix in his right hand while his Baird's ratsnake makes itself at home on his left arm.



Aaron LaForge brought a mossy prehensile-tailed gecko.

and Karen Bielski treated us to an Australian water dragon (*Physignathus lesueurii*). Josh Chernoff kept his very amicable black-and-white tegu (*Tupinambis merianae*) on the table as the lizard repeatedly flicked its long tongue. Jason Hood followed with a passel of Amazon tree boas (*Corallus hortulanus*) and talked about the difference in temperament between the wild-caught and captive-bred, expressing surprise and maybe disappointment that his wild-caught didn't bite him. Rick and Robert Hoppenrath, two men built for the task, hauled their very large Burmese python (*Python molurus*) to the front and told us the story of George. Michelle Neilson and Nick Rich handled a very calm and pretty African rock python (*Python sebae*), a remarkably healthy rescued ball python (*P. regius*) that was near death when she got it, and an active and confident savannah monitor (*Varanus exanthematicus*) recovering from a nasty burn. Dick Buchholz brought Nessie the alligator (*Alligator mississippiensis*) in her custom travel box, and Mike Perry complained about his leopard gecko (*Eublepharis macularius*), interrupting his homework. Maybe he wasn't complaining after all. We admired a gray with black speckles granite Burmese python that Nick D'Andrea showed along with a little newly purchased red-tailed boa (*Boa constrictor*). Andy Sagan, who is heavily into ratsnakes, convinced us that Baird's ratsnakes (*Pantherophis bairdi*) do not always deserve their bad reputation, and that a uromastix can make a better pet lizard than a bearded dragon, showing a nice Mali uromastix (*Uromastix maliensis*) and an Egyptian uromastix (*U. aegypticus*) as proof.

David Fourer snuck in a non-herp, but it counted because it's herp food, and he gave out free samples after the meeting. I didn't know that silkworms (*Bombyx mori*) are domesticated insects that cannot live without human care. Jack Schoenfelder brought his lesser siren (*Siren intermedia*), and it was the evening's only representative from the amphibians. He enthralled me with tales of its feeding strategies. Aaron LaForge dangled a mossy prehensile-tailed gecko (*Rhacodactylus chahoua*) from

one of his fingers and Shane Ager bragged about his Sudanese uromastix (*U. ocellata*). They announced that SEWERFest (August 3, www.sewerfest.com) will donate a dollar to the CHS for each paid admission. [For those who don't know, SEWERFest is shorthand for SouthEast Wisconsin Exotic Reptile Fest.] And last, after the incompetent host nearly overlooked him, Sam Blanton proudly showed off Lava Girl, his cornsnake, and Templeton, his skunk gecko (*Gekko vittatus*).

Show and Tell remains one of our most popular meetings, probably because we all love to show off our animals. The affection and attraction to the creatures that are so much a part of our lives is evident in all the presentations, but I was not the only person that noted the evolution that the event is going through. Not too many years ago, if the presenter was asked where they obtained the animal, the majority would say a reptile swap. This meeting the most common answer was adopted or rescued. I don't have anything against properly run reptile shows, but it's nice to see more CHS members helping with the growing population of unwanted herps. It was a good meeting, but next year I'd like to see more amphibians. It's the Chicago Herpetological Society, not the Chicago Reptile Society.

I know that many of you are losing sleep at night wondering how you can help your society. We want to give you a good night's rest, so on the forum is a new category titled "Now hiring". We'll be posting specific jobs that we need help with. Go there and check it out. We will try to have enough variety that everyone will have something they can do. Through the wonder of the internet, even you members that feel left out because you live on the other side of the world can probably help out. Did you know that you too can spread your wisdom and knowledge by writing for the bulletin? Submit articles of all kinds and more than likely Mike Dloogatch will publish it. Have more fun! Get involved!



Sam Blanton closed the show with his cornsnake, Lava Girl, and his skunk gecko named Templeton.

Unofficial Minutes of the CHS Board Meeting, June 13, 2008

The meeting was called to order at 7:35 P.M. at the Schaumburg Public Library. Board members Deb Krohn, Andy Malawy, Linda Malawy and Amy Sullivan were absent.

Officers' Reports

Recording Secretary: Cindy Rampacek read the minutes of the May 16 board meeting. Minor corrections were made and the minutes were accepted as corrected.

Treasurer: There were no questions or comments in regard to the emailed statements received in Andy's absence.

Membership Secretary: The list of failed renewals was once again shared with the board.

Sergeant-at-arms: Attendance at the May general meeting was 34.

Committee Reports

Shows:

- Peggy Notebaert shows are scheduled for the first weekend of every month. CHS tablecloths are now being stored in the taxidermy lab.
- Lake County Reptile Show, June 21.
- St. Hillary's Parish Picnic, 4-7 P.M., June 28.
- Argonne National Laboratory Picnic, July 12.
- Josh Chernoff will be doing local events for 15th Ward Alderman Toni Foulkes on July 19 and August 23. Get in touch with Josh if you'd like to help out.

We will be at the Lt. Governor's booth at the Illinois State Fair. We are still awaiting the exact dates.

Old Business

Symposium 2009: The committee is having problems in booking a hotel, finding that cost is a big issue. They hope to have a hotel secured by the July board meeting.

Zoo trip: We are looking towards a trip to the Toledo Zoo for this year.

CHS business cards: The cost is low enough to print both sides. We will have them soon to hand out.

Media course: Unfortunately courses were full for this year.

John will watch to see if something appropriate comes along again.

Portable signs: Dan Bavirsha gave the board a range of price quotes for portable, roll-up signs with and without graphics.

National Association: Jeff Barringer will be meeting with people at the Daytona National Breeders Conference. Cindy Rampacek will be joining the meeting along with Jason Hood possibly, who will also be in attendance. Cindy will report back at the September board meeting.

New Business

Stationery / thank-you notes: Deb Krohn will be getting a batch of CHS logo cards to send thank-you notes with.

December general meeting: The last Wednesday in December this year is New Year's Eve. We will be looking to change the meeting date to Tuesday, December 30, pending PNNM approval.

We are looking at recruiting more volunteers to help with running the CHS. Rich Crowley suggested a "Now Hiring" page for the website. Cindy Rampacek volunteered to coordinate volunteers.

Round Table

Cindy Rampacek shared a 63-year-old Florida cooter that was surrendered to her rescue.

Bob Bavirsha has a few Herp Keeper 2008 calendars. He will bring what is left to the next general meeting.

Rich's daughter is back from China and she said the level of baby snakes in the rice paddies was insane!

Matt O'Conner mentioned that his first published photos appear in the newly published *Amphibians and Reptiles of Georgia* by Jensen et al.

The CHS received a thank-you note in response to our recent donation to the Cryptobranchid Interest Group.

The meeting adjourned at 8:59 P.M.

Respectfully submitted by recording secretary Cindy Rampacek



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Herpetology 2008

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

OLFACTORY DISCRIMINATION BY TORTOISES

P. Galeotti et al. [2007, Copeia 2007(4):980-985] point out that many animals obtain reliable information about potential mates, including whether they are conspecific, sexually mature, and healthy or not, mostly from olfactory cues. Previous experiments with snakes and lizards have shown that individuals can recognize conspecifics, sex, mating status, and health condition of potential partners by chemical cues. Using choice experiments, the authors examined whether both male and female Hermann's tortoises, *Testudo hermanni*, can detect and distinguish the odor of conspecifics from that of another species and an odorless control, and are able to discriminate sex and sexual maturity of individuals by chemical cues. Both sexes were found to correctly discriminate between their own species and another species' odors, but only males could distinguish sex and sexual maturity of potential mates by olfactory cues. These results indicate a sexual dimorphism in olfactory sensitivity in this species that might be derived from sexual selection and suggest that males and females should rely on different communication channels during social interactions.

BUOYANCY REGULATION IN TWO TURTLE SPECIES

C. C. Peterson and D. Gomez [2008, Herpetologica 64(2): 141-148] note that the costs of an aquatic life are likely to be strongly influenced by an animal's buoyancy, which can be measured as specific gravity (SG). The shells of chelonians are negatively buoyant, and the tendency to sink is opposed by air in the lungs. Turtles can therefore regulate buoyancy by adjusting residual lung volume, but must do so within the constraint of the rigid shell. Emydids have been reported to effect changes in lung volume with reciprocal changes in the volume of water stored in the urinary bladder and, perhaps, for rapid short-term adjustments, the cloacal bursae. The authors examined buoyancy control in two species, the eastern painted turtle *Chrysemys picta*, which has well-developed cloacal bursae, and the common musk turtle *Sternotherus odoratus*, which lacks bursae. They measured SG in captive turtles, then manipulated SG by attaching either weights or floats, and measured SG again at 4 h and 24 h after attachment. Initial SG was consistently and significantly higher in bottom-walking *Sternotherus* (1.03) than in more free-swimming *Chrysemys* (1.01). Both species compensated nearly completely for weights up to 6% of body mass by decreasing weight in water (reflecting higher lung volumes); compensation in both species was mostly complete at 4 h. Both species also compensated for attached floats (buoyant forces equivalent to up to 4% of body mass in *Sternotherus* and at least 7% in *Chrysemys*) by decreasing lung volume. Lung volume changes (gauged by underwater weight) were not matched by changes in stored water volume (gauged by body mass in air) in *Sternotherus* and only partially matched in *Chrysemys*. Changes in lung volume did not affect surfacing frequency. Small differences in buoyancy regulation between species reflect differences

in natural history and, presumably, morphology, but neither the mechanisms of chronic lung-volume maintenance nor the function of cloacal bursae are clear.

TREEFROG SITE FIDELITY

S. E. Pittman et al. [2008, J. Herpetology 42(2):378-385] note that wetlands are essential breeding sites for many amphibians. The importance of terrestrial habitat for many aquatic-breeding amphibian species is well known, although often understudied and understated. This study examined the recapture rates, habitat use, and site fidelity of Cope's gray treefrogs (*Hyla chrysoscelis*) within and surrounding a wetland for 15 months. Using visible implant elastomer and visible implant alpha tags, individuals were tracked as they used a grid of 110 PVC pipes as refugia. PVC pipe refugia allow treefrogs to be sampled when not actively calling or breeding. The authors captured 82 individual frogs a total of 141 times (59 recaptures). Treefrogs occupied pipes every month except during winter (December, January and February). Recapture rates decreased during the breeding season (May, June and July). Preferred pipes were in terrestrial habitat or close to trees instead of in aquatic habitat devoid of trees. Treefrogs displayed high site fidelity; only three frogs were recaptured in pipes different from those in which they were originally captured. Results suggest that *H. chrysoscelis* select terrestrial habitat adjacent to wetlands and have high site fidelity, which could have important implications for the conservation of treefrogs and other wetland-breeding amphibians.

SOUTHEASTERN CROWNED SNAKE ECOLOGY

B. D. Todd et al. [2008, Copeia 2008(2):388-394] note that there are very few comprehensive studies of the ecology of small-bodied snakes. They describe the ecology and demography of the southeastern crowned snake (*Tantilla coronata*) based on 1,640 captures on the Savannah River Site in the Upper Coastal Plain of South Carolina, from 1951 through 2007. Female *T. coronata* were significantly longer, heavier, and heavier-bodied than males but had relatively shorter tails. Clutch size based on oviductal eggs was positively correlated to maternal body mass and length. Snakes exhibited a unimodal seasonal activity pattern that peaked in summer. Pitfall captures were significantly male-biased during July–October, corresponding to the suggested mating period for this species in this part of its range. Three classes of animals in the population were identified: neonates; second year animals; and older animals that included both non-reproductive subadults and reproductive adults. Longevity was at least five years for two recaptured males originally captured as mature adults. Centipede species were the exclusive prey identified from *T. coronata* collected on the Savannah River Site. This study demonstrates that research on underrepresented species is possible and can contribute to understanding of snake ecology.

STATUS OF A POORLY KNOWN ASIAN PITVIPER

P. Guo et al. [2007, The Herpetological Journal, 17(4):237-246] note that despite much systematic work in recent years on the Asian pitviper genus *Protobothrops*, the phylogenetic position of *P. kaulbacki* remains poorly understood due to its rarity and the inaccessibility of its range. Long regarded as morphologically close to *P. jerdonii*, the species has been widely treated as a member of *Protobothrops*. This paper examines the phylogenetic position of this species using skull characteristics, ecological, hemipenial and molecular data. A molecular phylogeny, based on four mitochondrial genes, shows that the species forms a very highly supported sister-group relationship with *Triceratolepidophis sieversorum*, and is distinct from all other *Protobothrops* species. The authors discuss the alternative systematic arrangements that could take into account these newly discovered relationships of *P. kaulbacki*, provide a redescription of the species and summarize the available information on the distribution and natural history of *P. kaulbacki*.

LYRESNAKE SPECIES COMPLEX

T. J. Devitt et al. [2008, Copeia 2008(2):370-387] note that the western lyresnake (*Trimorphodon biscutatus*) inhabits arid regions from the desert southwestern United States southward along the Pacific lowland versant to northwestern Costa Rica and exhibits substantial geographic variation in size, squamation and color pattern. Patterns of geographic variation within *T. biscutatus* were examined using multivariate statistical analyses of 33 morphological characters scored from 429 specimens. Principal components and discriminant analysis revealed six morphologically distinct groups that are generally concordant with lineages recovered in a phylogeographic analysis of mitochondrial DNA and with taxa traditionally recognized as species or subspecies. The authors conclude that *Trimorphodon biscutatus* (sensu lato) comprises six evolutionary species (including the recently elevated *T. wilkinsonii*) and recommend elevating *T. biscutatus* (sensu stricto), *T. lambda*, *T. lyrophanes*, *T. paucimaculatus*, and *T. quadruplex* to the species level. A key to the species of *Trimorphodon* is provided.

TERRESTRIAL ACTIVITY OF PAINTED TURTLES

D. R. Bowne [2008, Copeia 2008(2):306-310] reports on non-nesting terrestrial activity by *Chrysemys picta* in Virginia. A 3-year project followed 60 adult turtles by radiotelemetry, primarily during the summer, with 22 of them being detected on land. Fifteen turtles dispersed overland at distances up to 3300 m, two turtles nested, four turtles estivated on land for a mean of 34 days, and an adult male overwintered on land for approximately 290 days. Terrestrial activity was evidently prompted by drying of home ponds. Most available upland habitats were used, with slight preferences by dispersing turtles for wooded habitats and by estivating turtles for non-wooded habitats. Estivation on land by *C. picta* has rarely been reported but may be fairly common during periods of drought. Overwintering on land by adult *C. picta* has not been reported and will require additional research to explain the physiological responses needed to survive. This study underscores the importance of upland habitat in the life history and conservation of freshwater turtles.

NEW SPECIES OF LONG-TAILED RATTLESNAKE

J. A. Campbell and O. Flores-Villela [2008, Herpetologica 64(2):246-257] describe *Crotalus ericsmithi*, a distinctive new species of rattlesnake from the western versant of the Sierra Madre del Sur of Guerrero, Mexico. The type specimen, so far the only specimen known, was taken after dark as it crawled along the side of an unpaved mountain road. This long-tailed rattlesnake cannot be confused with any other species of rattlesnake and is most similar to *C. stejnegeri* and *C. lannomi*. It possesses a strikingly distinct color pattern and differs from all other rattlesnakes in aspects of scalation. The authors “take pleasure in naming this species for Eric N. Smith, a talented young scientist with a propensity for making exciting discoveries through arduous fieldwork.” They suggest standard English and Spanish names for the new species: Guerreran long-tailed rattlesnake—cascabel cola-larga de Guerrero.

INCUBATION TEMPERATURES AFFECT BEHAVIOR

K. M. Hare et al. [2008, Copeia 2008(1):16-22] investigated the effects of artificial incubation regimes, experimental temperature and age on the locomotor performance of New Zealand’s only endemic oviparous lizard, *Oligosoma suteri*. Artificial incubation is often used to produce founders of new populations of endangered reptiles and can have significant effect on juvenile phenotype. Eggs of *O. suteri* were randomly distributed among three incubation temperatures (18, 22, 26°C). Juvenile ($n = 117$) maximum sprint speed was measured over three trials at 18, 22 and 26°C, and at one and four months of age, and behaviors during sprint trials recorded. Sprint speed increased with increased experimental temperature and with age. After removing the effect of individual size, juveniles incubated at 18°C were slower and exhibited locomotor behaviors likely to reduce survival (running towards stimulus). Individuals were consistently fast (or slow) at any given age or experimental temperature. The data suggest that *O. suteri* incubated at warmer temperatures may have higher survival when released to the wild.

SEYCHELLES FROGS

J. Gerlach [2007, The Herpetological Journal 17(2):115-122] evaluates the distribution and population densities of the Sooglossidae. This family of frogs is endemic to the Seychelles Islands where four species are restricted to high forests on the islands of Mahé and Silhouette. New distribution data are presented and habitat preferences quantified. Previously *Sooglossus thomasseti* was considered to be restricted to moss forest; here it is shown that the species is found in boulder fields, with the highest population densities in the moss forest zone, but occurs down to 80 m above sea level. *Sooglossus sechellensis* is also largely associated with higher altitudes, but suitable microclimates may occur at 300 m a.s.l. *Sooglossus pipilodryas* is restricted to palm-rich habitat on Silhouette island. *Sooglossus gardineri* is the most widespread and tolerant species and the only one to occur in degraded habitats. Monitoring methods are evaluated, with direct estimation from quadrats being the preferred method. All four species are considered Vulnerable due to their restricted ranges; *S. thomasseti* and *S. sechellensis* may also be threatened by habitat loss.

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, \$.17 each; fuzzies, \$.24 each; hoppers, \$.30 each; weanling, \$.42; adult, \$.48. Rats: starting with pinks at \$.45 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. PO Box 85, Alpine TX 79831. Call **toll-free** at (800) 720-0076 or visit our website: <http://www.themousefactory.com>.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Graptemys.com T-shirts, 100% cotton, pre-shrunk, pigment-dyed shirts with the Graptemys.com embroidered logo. These are very high quality shirts with that stylish faded look. Sizes S-M-L-XL-XXL. Colors: Pacific blue, nautical red, brick red, plum, granite, khaki green and putty. All profits made from these shirts goes directly to in situ *Graptemys* research. \$20 each with \$3.00 shipping. Email: chris@graptemys.com or call (239) 437-4148 to order. You can look at the shirts at <http://www.graptemys.com/shirts.htm>

For sale: Never used Neodesha glass front cages; eight 24" (\$45 each), nine 36" (\$75 each), & three 48" (\$155 each). All were purchased new from the manufacturer (Bush Herp) just months before they closed down. I originally purchased them for a tortoise breeding project which did not materialize. These are perfect for snakes, lizards, spiders or ?? They all have side vents with doors and front litter/moisture dams. Prices are wholesale cost. I also have new incandescent fixtures for each. Will sell individual units for above prices or all for \$1,200. Bob Krause, 224-875-0090, robertkrause@aol.com Also have various aquariums, new screen covers etc.

For sale: Neodesha cages, with 2' dams. Have four 36" with single piece plate glass and aluminum top guide, asking \$50 ea. Have six 48" with two piece plate glass and aluminum top guide, asking \$120 ea. Never exposed to sunlight. None previously used to house animals. Ben Entwisle, Entwisleassoc@aol.com, (r) 815-838-2871, (o) 815-838-1200, (c) 815-685-2740.

For sale: books. Guiler, Dr. Eric—*The Tasmanian Tiger in Pictures*, 1991, 28 pp., many b&w photos, an interesting account of the thylacine by its leading authority, many of the photos are of valuable historic interest, (s), \$50; Hoser, Raymond T.—*Australian Reptiles & Frogs*, 1989, 238 8½ × 11½" pp., 631 color photos of herps and their habitats, range maps, bibliography, info on captive husbandry, conservation, reptile photography, close-up color photo of head of a green python on cover, DJ, (h), \$235; Minton, Sherman A., Jr.—*A Contribution to the Herpetology of West Pakistan*, 1966, 158 pp., 28 plates (2–3 b&w photos per plate), 12 figs., 7 tables. This is an imperfect copy of this scarce title—the last 30 pages (pp. 155–184) are missing and have been replaced by a repeat of pp. 59–90. Book title and author are hand-printed in ink on spine, (s), \$75; Bridges, William—*Gathering of Animals—An Unconventional History of the New York Zoological Society*, 1974, 518 pp., many b&w photos, an easy read of the history of this illustrious organization with anecdotes about such luminaries as Ditmars, Crandall, Beebe, Hornaday, and Fairfield Osborn, excellent condition, DJ, (h), \$26; Breeden, Stan & Kay—*Animals of Eastern Australia—A Photographic Account of the Mammals, Reptiles and Amphibia*, 1967, 128 pp., 197 b&w and 24 color photos, essentially an album of fine photos with captions, half the book is herps, DJ, (h), \$40. Prices include postage. William R. Turner, 7395 S. Downing Circle W.; Centennial, CO 80122; telephone (303) 795-5128; e-mail: toursbyturner@aol.com.

For sale: Well started 2008 C.H. Sri Lankan stars, leopard tortoises and pancake tortoises. All captive-hatched by us and eating great. Stars are \$450 each, with temperature-sexed pairs from unrelated females available. Leopards are \$125 each and pancakes are \$350. Contact Jim or Kirsten Kranz at 262-654-6303 or e-mail KKranz1@wi.rr.com.

For sale: Trophy quality jungle carpet, diamond-jungle, and jaguar carpet pythons. Website: moreliapython.googlepages.com E-mail: junglejohn@tds.net

For sale: Well started spider morph ball pythons (*Python regius*) available for free delivery in the Chicagoland area—males, \$350. Also available are high-contrast, Sarawak locality and Walnut × Sarawak pairing Borneo pythons (*Python breitensteini*). Pricing is based on male sex with \$50 more for females, if available: 2007 high-contrast, \$150; 2007 Sarawak, \$175; 2006 Sarawak, \$200, 2007 Walnut × Sarawak (melanistic Borneos), \$125. All feeding on frozen thawed adult mice and/or rats. Shipping available as an additional cost, if needed. Details and helpful info on my website at www.richcrowleyreptiles.com Contact Rich Crowley at 708-646-4058 or email pogona31@yahoo.com.

Herp tours: **Madagascar—Tortoise Tour & Chameleon Tour** seeking adventurous members for January–February 2009. The goal of the tortoise tour, to be co-led by **Peter Pritchard** of the Chelonian Research Institute and **Bill Love**, will be to see all native species in the wild and record various aspects of their lives photographically. The later chameleon tour, co-led by **Mike Monge** of FL Chams and **Bill Love**, will focus on panther chameleons, trying to find and photograph as many of the color morphs as possible in the wild. Details are at Blue Chameleon Ventures' site at: www.bluechameleon.org.

Herp tours: The beautiful Amazon! Costa Rica from the Atlantic to the Pacific! Esquinas Rainforest Lodge, the Osa Peninsula, Santa Rosa National Park, and a host of other great places to find herps and relax. Remember, you get what you pay for, so go with the best! GreenTracks, Inc. offers the finest from wildlife tours to adventure travel, led by internationally acclaimed herpers and naturalists. Visit our website <http://www.greentracks.com> or call (800) 892-1035, E-mail: info@greentracks.com

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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, July 30, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Ben J. Evans** of McMaster University in Hamilton, Ontario, Canada, will speak on “Molecular Markers Shed Light on Cryptic Diversity and Evolutionary Processes: Case Studies from Indonesia and the Democratic Republic of the Congo.” Dr. Evans will first focus on the Indonesian island of Sulawesi where geological and ecological factors have generated similar patterns of diversity among multiple species. He will then turn to the Itombwe Plateau in the Democratic Republic of the Congo, where recent studies have uncovered a previously uncharacterized species of clawed frog that is emblematic of the high conservation value of this poorly studied area.

At the August 27 meeting, **Dr. Michael Lannoo**, a professor at the Muncie Center for Medical Education, Indiana University School of Medicine, will speak on amphibian malformations. Dr. Lannoo is a major figure in the amphibian decline investigations being conducted in the Midwest and the nation.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago’s newest museum — the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

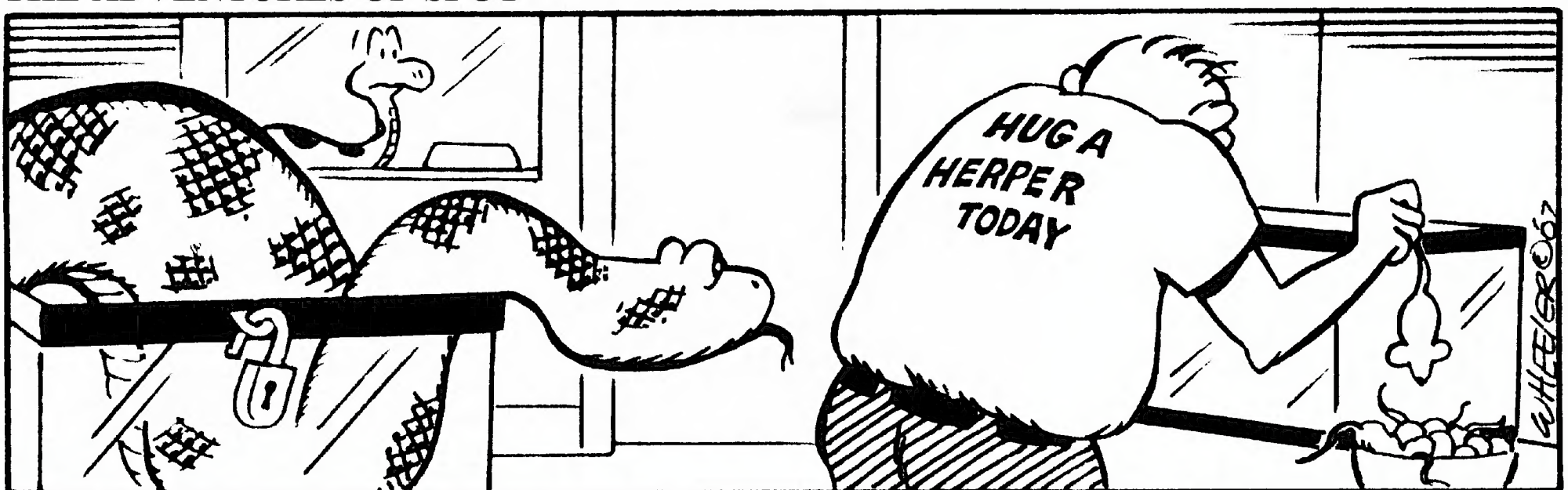
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., August 15, in the adult meeting room on the second floor of the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

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